

Claims

1. Laser treatment apparatus for ophthalmic surgery, comprising a headrest (2) for a patient and a contact glass (23), which can be placed onto the eye (21) and through which a treatment laser beam (L) is incident, wherein a safety mechanism (24, 25) is provided which moves the headrest (2) and the contact glass (23) apart when a force is directed onto the contact glass (23) counter to the direction of incidence of the laser beam,

characterized in that the safety mechanism (24, 25) enables such separating movement only at a force exceeding a limit value of force (F_{min}) and fixes the headrest (2) and the contact glass (23) relative to each other if said force is below the limit value of force.

2. The laser treatment apparatus as claimed in claim 1, characterized in that the safety mechanism (24, 25) retracts the contact glass (23).

3. The laser treatment apparatus as claimed in claim 1 or 2, characterized in that the limit value of force (F_{min}) is caused by at least one of the following: elastic force and/or weight force.

4. The laser treatment apparatus as claimed in claim 1, 2 or 3, characterized in that the contact glass (23) is mounted to a holding element (24) which is pressed against a stop of the housing (B, 6) with a force defining the limit value of force (F_{min}).

5. The laser treatment apparatus as claimed in claim 4, characterized in that the holding element (24) also carries focusing optics (20), which focus the treatment laser beam (L) into or onto the eye (21).

6. The laser treatment apparatus as claimed in any one of the above claims, characterized in that the limit value of force is 1 Newton.

7. Laser treatment apparatus for ophthalmic surgery, comprising

- a headrest (2) for a patient;
- a beam-deflecting unit (15, 16) which variably deflects the treatment laser beam (L) about at least one axis (S2);
- focusing optics (20) arranged following the beam-deflecting unit (15, 16), said optics focusing the laser beam (L) along an optical axis into or onto the eye (21);
- a contact glass (23), which can be placed in the eye (21) and is arranged following the focusing optics (20), and
- a safety mechanism (24, 25) which moves the headrest (2) and the contact glass (23) apart when a force is directed onto the contact glass (23) counter to the direction of incidence of the laser beam;

characterized in that

- the beam-deflecting unit (15, 16) is arranged in the entrance pupil of the focusing optics (20) at least with respect to a deflecting element (15) acting for said one axis (S2) of deflection, and

- the safety mechanism (24, 25) couples the contact glass (23), the focusing optics (20) and the deflecting element (15) such that, when moving apart, the deflecting element (15) remains in the entrance pupil and the length of the light path between the deflecting element (15) and the contact glass (23) is constant.

8. Laser treatment apparatus as claimed in claim 7, characterized in that the safety mechanism (24, 25) retracts the contact glass (23).

9. Laser treatment apparatus as claimed in claim 8, characterized in that the contact glass, the focusing optics and the deflecting element are rigidly connected to form a unit and the safety mechanism comprises a longitudinal guide of this unit.

10. Laser treatment apparatus as claimed in claim 8 or 9, characterized in that the light path of the laser beam (L) following the entrance pupil of the focusing optics (20) is folded at least once (18) and the safety mechanism (24, 25) causes a joint rotary movement or pivotal movement of the contact glass (23), the focusing optics (20) and the deflecting element (15) during retraction.

11. The laser treatment apparatus as claimed in claim 10, characterized in that the contact glass (23), the focusing optics (20) and the deflecting element (15) are rigidly connected to form an arm and that the safety mechanism comprises a rotary support (25) for the arm with the axes of rotation lying in the entrance pupil plane.

12. The laser treatment apparatus as claimed in any one of claims 8 to 11, characterized in that the safety mechanism (24, 25) comprises a weight force compensating unit (27, 28), in particular in the form of a counterweight or a spring element (27, 41).

13. The laser treatment apparatus as claimed in claim 12 in combination with any one of claims 1 to 6, characterized in that the weight force compensating unit (27, 28) sets the limit value of force.

14. The laser treatment apparatus as claimed in claim 11 in combination with any one of claims 1 to 6, characterized in that the arm is supported at the housing (B) of the laser treatment apparatus (1) at the limit value of force (F_{min}).

15. The laser treatment apparatus as claimed in any one of claims 7 to 14, characterized by a supporting unit (34, 36), which comprises a support (34) which can be placed in contact with the patient's body (33) and is coupled to the safety mechanism (24, 25) such that a certain force acting on the support (34) counter to the direction of incidence of the laser beam also causes said separating movement.

16. The laser treatment apparatus as claimed in any one of the above claims, characterized by a bed (2), which is movable along the direction of incidence of the laser beam and comprises the headrest, with the safety mechanism for moving apart moving the bed (2).

17. Laser treatment apparatus for ophthalmic surgery, comprising a contact glass (23), which can be placed on the eye (21) and through which a treatment laser beam (L) is incident, and a safety mechanism (24, 25) holding the contact glass (23) moveable such that it retracts when a force is directed onto the contact glass (23) counter to the direction of incidence of the laser beam,

characterized in that the safety mechanism (24, 25) comprises a detecting unit (29, 46) which monitors retraction of the contact glass (23) and interrupts laser treatment operation of the laser treatment apparatus (1) if movement of the contact glass exceeds a threshold value (P1).

18. The laser treatment apparatus as claimed in any one of the above claims, characterized in that the safety mechanism comprises a drive (28, 5) for actively moving the contact glass (23) and the eye (21) apart, and a control unit (C) controls the drive (28, 5) so as to actively effect said separating movement in case of a force exceeding the limit value of force (Fmin) or of a contact glass movement exceeding the threshold value (P1), respectively.

19. The laser treatment apparatus as claimed in claims 18 and 10, characterized in that the drive (28) effects a pivotal or rotary movement.

20. The laser treatment apparatus as claimed in claims 18 and 11, characterized in that the drive (28) rotates the arm.

21. The laser treatment apparatus as claimed in claims 15 and 17, characterized in that the detecting unit detects a pressure on the support (34).

22. The laser treatment apparatus as claimed in claims 16 and 17, characterized in that the safety mechanism additionally lowers the bed (2) in case of the contact glass movement exceeding the threshold value (P1).